Technological competence mapping in the North Sea region

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ECOWindS – The European Clusters for Offshore Wind Servicing

NEWSLETTER

2

2013

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HANS A. PEDERSEN
project leader ECOWindS

Editorial

On behalf of the ECOWindS project team, I'm happy to welcome you to our second newsletter. The intention of this newsletter is to keep all involved partners, regional authorities, the industry, and other stakeholders well informed in a series of six issues during the three-year period of the project.

The second Project Steering Group meeting, in Ålesund on 21 May 2013, confirmed that good progress has been made by the project's seven partners. Below you will find the report on the Project Steering Group meeting.

germanwind has compiled a comprehensive report, the "Analytical Framework for Regional Mapping", to guide each partner through the process of regional mapping. This regional mapping is ongoing in each of the four regions, led by the seven partners. It will involve local stakeholders who, during October, November and December, will be invited to a regional workshop in each of the four regions involved. The Technical University of Denmark has conducted a mapping of regional technological competencies, based on information regarding patent applications. The first promising results are presented in this newsletter.

The project is defined in seven work packages, each of them identifying objectives and responsibilities. Please read the descriptions below.

In the newsletter you will also find presentations from our two Norwegian partner clusters. You will learn about the clusters, their specialisation, the institutes involved and their role in the offshore sector, their contribution to ECOWindS, and the outcome expected.

Hans A Pedersen

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Second Project Steering Group meeting held in Ålesund, Norway

The seven ECOWindS partners met in May in Ålesund, Norway, to conduct their second Project Steering Group meeting, hosted by project partner Ålesund Knowledge Park (ÅKP).

Participants of the second Project Steering Group meeting

All partners had used the first six months to set up their organizations, agree on how to collaborate, and define the concepts and objectives of the project. This led to improvements in the original project plan as tasks and measurable goals were updated to make use of synergies, save time and improve outcomes. So far we have submitted the seven scheduled deliverables and another two amendments; they have all been approved.

The group agreed to continue project reporting in the usual manner until the new electronic reporting system on the EU Participant Portal website became accessible to the ECOWindS project, allowing reporting in solely electronic form.

Susanne Findeisen of germanwind presented a comprehensive report, the "Analytical Framework for Regional Mapping", and corresponding templates. This framework will ensure that all partners use the same methodology and definitions, have a common understanding of the project, and thereby improve results in the process of regional mapping.

Lars Alkærsig of the Technical University of Denmark presented the first outcomes of his analysis of regional mapping based on information from patent applications. Initial conclusions confirm the assumption that the North Sea region is an area/centre of competence. Further analysis will go into more detail and the results will be presented at relevant conferences.

The ECOWindS partners will invite relevant stakeholders to regional workshops to improve regional mapping and to discuss and validate the conclusions. The workshops will be held in each of the four regions during October, November and December 2013.

Ålesund Knowledge Park (ÅKP) and Ålesund University College introduced their impressive Offshore Simulation Centre, said to be the world's most advanced provider of simulation programmes for difficult offshore operations. Participants at the meeting had the opportunity to undertake a simulated voyage in seas with seven-metre waves. Everyone was really impressed and almost felt seasick!

The next meeting of the Project Steering Group, hosted by OrbisEnergy, will be held in the UK on 27 November 2013.

germanwind: Regional mapping of the offshore wind servicing sector

The offshore wind servicing (OWS) sector is a growing sub-sector of the offshore wind industry. Information on the structure and functioning of the OWS sector is rather limited in offshore clusters. Therefore it is a key task during the first period of ECOWindS's activity to deeply analyse the sector in each of ECOWindS's offshore clusters in order to identify strengths and weaknesses regarding innovation capacity. The outcomes of this mapping will provide the basis for developing cluster strategies and action plans and will be utilised for a cross-cluster comparison of ECOWindS's clusters and for a joint action plan to strengthen the innovation capacity of the OWS sector.

As the work package leader for "Regional Mapping", germanwind is setting the framework for the analysis of the OWS sector. germanwind has developed and elaborated a comprehensive analytical framework based on SWOT analysis and the technological innovation system (TIS) approach developed by Utrecht University in the Netherlands in cooperation with other European institutions. The analytical framework will be applied by ECOWindS's partners and support the production of comparative results in all analysed clusters.

A wide range of relevant internal and external factors is covered in the analysis:

- How is the cluster structured and managed?
- Who are the industrial, research and other relevant actors in the OWS sector?
- Which networks are active and what formal and informal collaboration take place in the cluster?
- What infrastructure is available in the cluster region?
- Which competences and knowledge are available in the cluster?
- How does the market function and who are the competitors?
- Are there any relevant environmental factors?
- How is the technology accepted? What are the expectations?
- Do any global trends have supportive or adverse effects on the OWS business?

germanwind is supporting this analysis with its own analysis of publications in the field of offshore wind. This publication analysis, carried out by analysing data from the Web of Knowledge, will show us the level of publication activities in the clusters.

While all partners are well on the way to mapping their clusters, preparations have begun to plan and organise a regional mapping workshop in each cluster. These two-day workshops will be held in October and November this year and will involve ten to fifteen selected stakeholders and experts in government administration, industry, and research. Applying this triple-helix concept will guarantee valuable input from all relevant perspectives, and is needed to verify outcomes.

OrbisEnergy (UK) gets ready to explore regional synergies

All ECOWindS partners are currently undertaking detailed regional mapping exercises to define the offshore wind servicing (OWS) cluster in our respective countries.

This will form the basis of a robust SWOT analysis for each cluster before a series of workshops, led by germanwind, is held in each country to validate the information and brainstorm methods to encourage innovation and collaborative research across Europe.

As part of this series of workshops, UK partner OrbisEnergy is gearing up to assess and prioritise research which will be generated in collaboration with a range of industry partners, research bodies and governments.

The regional cluster workshops will take place in October, November and December, ending with a partner workshop being held in the UK to bring together all of the regional mapping, SWOT analysis and strategic orientation reviews which will inform the prioritisation of research objectives and the initial phase of ECOWindS's joint action plan.

For more information on the regional research priorities work, please contact either Rebecca Murphy or Johnathan Reynolds.

Technological competence mapping in the North Sea region

Analysis: Lars Alkærsig, Assistant Professor, Technical University of Denmark (DTU), DTU Management Engineering

Reporting: Kalle A. Piirainen, Postdoc Researcher, Technical University of Denmark (DTU), DTU Management Engineering

As a Part of ECOWindS WP2, the Technical University of Denmark (DTU) has undertaken competence mapping by analysing patenting behaviour within the offshore wind servicing (OWS) sector around the North Sea. The activities of the sector include support activities that enable the building and reliable operation of an offshore farm throughout its life cycle[1]. Thus the OWS sector is at the intersection of the (onshore) wind industry, the electromechanical installation industry, the operations and maintenance service industry, the offshore (oil, gas and mining) industry (including offshore marine services and offshore support vessel operation), as well as the building and construction, civil engineering and maritime construction industries (Figure 1).

Following this definition of OWS, the analysis focused on patents filed at the World Patent Office and/or the European Patent Office, using the OECD 2013 REGPAT database to link patent applications to geographic locations.

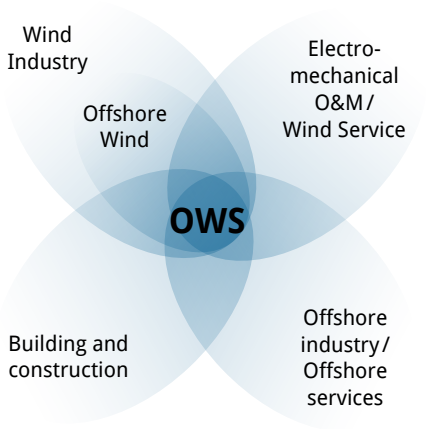

Figure 1: Illustration of the position of OWS to adjacent, established industries

In collaboration with technical experts in the field, a number of technology areas were identified and associated with one or more classes in the International Patent Classification (IPC).

Altogether eleven specific technology areas within OWS were identified, but four had to be excluded from statistical analysis due to the low number of observations.

[1] These activities include: 1) transportation of wind turbine and associated components, such as array cabling, grid cabling, transformers, foundations, anchoring and other substructures, onshore and offshore; 2) pre-assembly of turbines and associated equipment onshore, construction of substructures and installation of turbines, cabling and grids offshore; 3) operations and maintenance during the lifetime of the wind farm; and 4) repowering and decommissioning the wind farm at the end of its life cycle.

They are marked with an asterisk in the following list.

- Cranes and lifting
- Foundations
- Grid connection
- Jack-up barges
- Positioning and anchoring
- Support structure
- Vessels
- Transformer arrays*
- Welding tools*
- Remote operated vehicles*
- Inspection*

Preliminary results from the patent analysis indicate that the partner regions around the North Sea have a global technological lead in OWS technology development. Patents in the ECOWindS partner regions – the offshore wind cluster of northwest Germany with the Bremerhaven region at its core, the United Kingdom's East Anglia extended region, Norway, and Denmark[2] – together comprise up to 60 percent of World Patent Office and/or European Patent Office patents filed in the seven key technology areas. Cranes, jack-up barges and positioning are particularly strong, having between 50 to just over 60 percent of World and European patents filed for these technologies (Figure 2). The figure also shows that the ECOWindS regions are strong investors in OWS technologies, surpassing much larger economies including the Republic of Korea, Japan and China in most technology areas (separate figure not included).

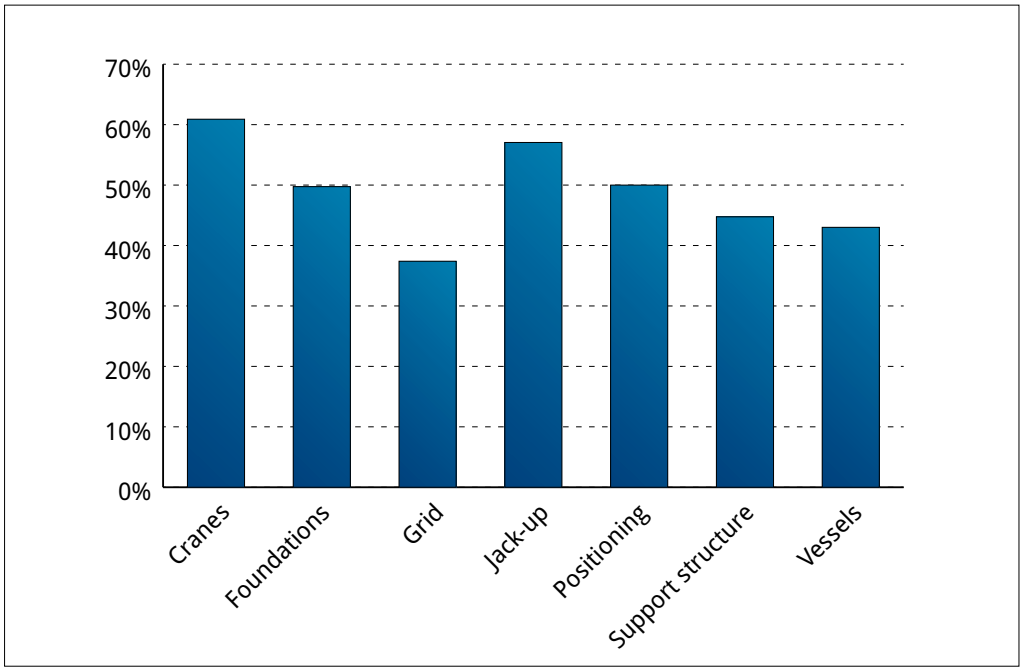

Figure 2: ECOWindS regions' share of relevant World and European patent applications (analysis by Lars Alkærsig based on PATSTAT and OECD REGPAT data)

The analysis also reveals that ECOWindS regions have high potential for developing significant synergies as their patenting profiles exhibit different but complementary strengths in the relevant technology areas. For instance, while Germany has a very strong position in crane and positioning technologies, the UK and Norway have complementary strengths in jack-up technologies (Figure 3).

[2] The analysis in this paper concerns the extended regions of North West Germany/Expanded Bremerhaven region and expanded East Anglia region, while due to geographically small NUTS regions, and consequent small number of observations per region, Denmark and Norway are analysed on the country level.

In Norway and Denmark, the share of OWS-relevant patents is an order of magnitude larger than in the other regions and countries (just over 1 percent of total patents vs. approximately 0.1 percent in Germany, US and Japan, for example; a figure with these statistics is not included).

While all the regions do invest in technology, figures suggest that Germany and Denmark have been more consistent in investing in different aspects of OWS technology, or at least have patented their technology more consistently.

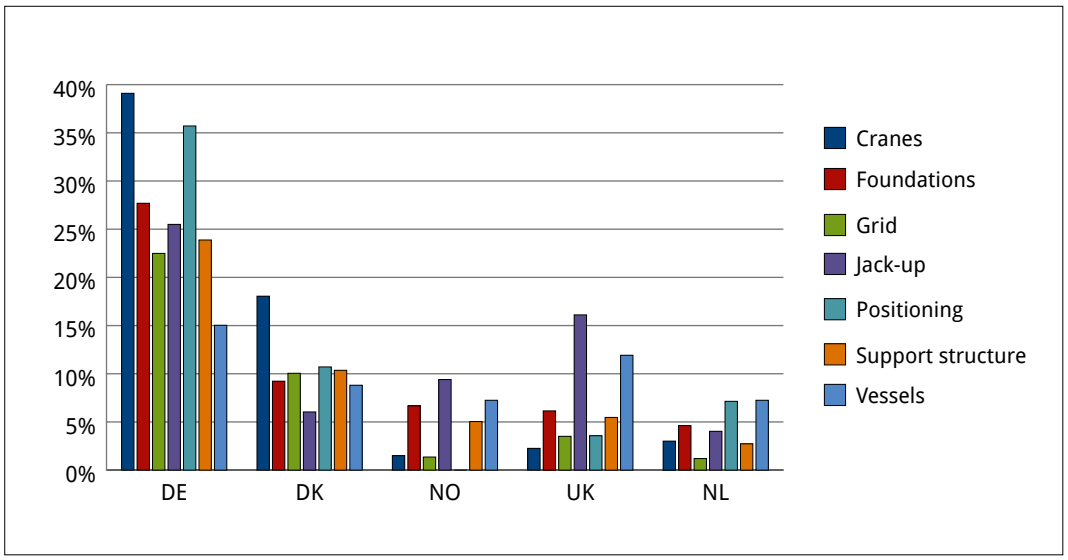

Figure 3: ECOWindS regions' share of patent applications for World and European patents in each area of technology; the Netherlands (NL) is included for comparison (analysis by Lars Alkærsig based on PATSTAT and OECD REGPAT data)

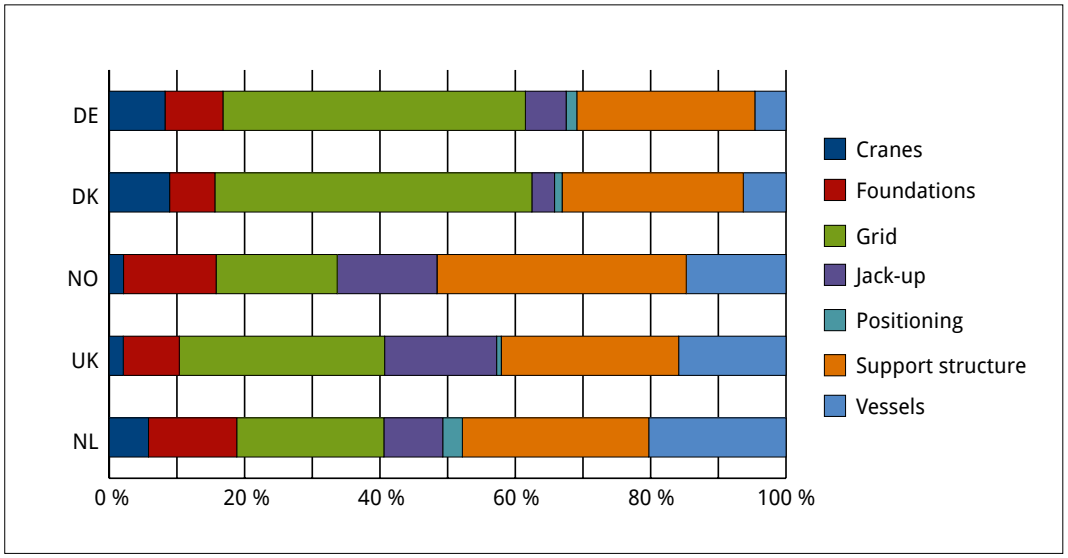

Figure 4: Regional specialisation/technology profiles based on filed patent applications (analysis by Lars Alkærsig based on PATSTAT and OECD REGPAT data)

Regional specialisation and synergies are even more apparent when looking at the relative share of patents between relevant technology areas within regions. Here Norway's concentration on jack-ups and vessels, mirrored by the UK, as well as foundation and support structure technologies, becomes apparent, while Denmark and Germany have been investing more on grid technologies (Figure 4). This figure reinforces the suggestion that ECOWindS regions have complementary strengths, and that collaboration will bring synergies.

The caveat in the analysis is that patenting does not directly measure 'technological competence', as not all forms of relevant competences are patentable. Furthermore, due to differences in national and individual preferences, some organisations may choose to protect their competence by secrecy rather than through patenting. To correct for this bias, the number of patent applications within OWS was compared to the overall patenting activity in each region; however, this did not change the results. Patent applications are a state-of-the-art objective surrogate measure employed widely in research, giving a reliable indication on the relative strengths of the regions compared to global competition.

The analysis will be further refined, and up-to-date findings will be published on the ECOWindS website during the fourth quarter of 2013 as well as in relevant academic conferences and journals. The final analysis will detail the methodology used and refine conclusions on regional specialties, competences and synergies between the regions, triangulating with on-going qualitative regional mapping.

For more information,
please contact the ECOWindS partners:
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ÅKP – a key maritime knowledge and innovation hub

The innovation company Ålesund Knowledge Park (ÅKP) was established in 1999 and is owned jointly by private businesses and local authorities. ÅKP contributes to economic development in the region thanks to a series of ground-breaking initiatives established in close cooperation with new and already existing companies, local governments, and national authorities.

ÅKP works to develop business potential in knowledge-driven and innovative businesses, both in newly established companies and in large corporations working in the region's key industries. ÅKP works together with regional, national, and international knowledge and research centres, and is up-to date with all available development packages and support programs for innovation and economic development.

The common denominator for ÅKP's activities is the development and industrialisation of ocean space, which involves utilising the resources that lie in the oceans, whether energy sources, minerals or food. ÅKP participates in a range of national and international projects and programmes, and has been awarded the management of three important initiatives, which, together with some other projects, today constitutes the major share of ÅKP's activities: Incubator ÅKP, the Ocean Ingredients Cluster and the Norwegian Centre of Expertise - Maritime.

The world-class maritime cluster of Møre and NCE Maritime

Regardless of its small size, the region of Møre on the west coast of Norway boasts an impressive constellation of maritime companies and training, research and finance institutions. Fifteen ship design companies, 14 shipyards, 165 equipment suppliers, and 19 shipping companies design, build, equip, and operate the lion's share of the largest and most advanced offshore vessels in the world. These companies employ over 22,000 people in the region and in 2012 had a combined turnover of EUR 6.5 billion.

The explanation for this phenomenal concentration of skills and know-how is often found in the harsh environment of the area. For centuries, the extreme nature and climate of the west coast of Norway have forced the population in the region to create powerful and solid vessels in order to survive and make a living.

In the 1970s, with the development of the oil sector in the North Sea, the multitude of maritime companies in the region grew into a cluster closely connected to the offshore oil and gas industry. The need to handle new, challenging tasks under harsh conditions has led to the development of more and more advanced vessels. Today, the area's unique know-how is applied to the design and construction of the largest and most innovative vessels for the global oil industry. The maritime cluster in Møre is also in the forefront when it comes to making ship equipment for advanced marine operations such as anchor handling, dynamic positioning, and propeller installations.

> "Most of the companies in the cluster do business all over the world. At the same time, the unique concentration of expertise in the region of Ålesund attracts multinational companies to the world-class cluster there. Rolls Royce Marine, Farstad Shipping, VARD, Ulstein Group, Bourbon Norway, and many others, have chosen precisely Møre for their base due to its exceptional concentration of skills and know-how."
>
> Per Erik Dalen, CEO, ÅKP - NCE Maritime.

The strength of the maritime cluster in Møre lies in its mixture of cooperation, competition, geographical proximity, and the open communication among all involved, which galvanizes the innovative potential of its companies. More than half of the world's most advanced offshore vessels are designed, built, equipped, and operated by the companies in the Møre maritime cluster.

Norwegian Centre of Expertise – MARITIME

Norwegian Centre of Expertise
MARITIME

To promote the future development of the maritime cluster in Møre, the Norwegian government has awarded it the status of Norwegian Centre of Expertise (NCE). NCE is a label of excellence given only to the most internationally competitive regional clusters in Norway. NCE Maritime's main goal is to further strengthen the cluster's position in its core activities: advanced marine operations.

> "The organisation's mission is to increase the innovation rate in the cluster through specific projects introducing new ideas and know-how, and sharpening the cluster's competitive edge. NCE Maritime works closely with international education and research institutions and cultivates the mechanisms that lead to knowledge upgrading and innovation. The ECOWindS project is an example of how we introduce new knowledge and ideas into the cluster."
>
> Per Erik Dalen, CEO at NCE Maritime

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The companies in the cluster have unique knowledge and competence in advanced marine operations and maintenance, and in the repair of oil rigs and other installations at sea. The maritime industry has had long experience with rough conditions in the North Sea and the Arctic and this experience could be of importance to the ECOWindS project. As an example, Danish shipowner ESVAGT has just signed a contract for the design and construction of two offshore wind turbine service vessels from the Norwegian shipyard Havyard. ESVAGT is a new customer for Havyard, and it is also the first time Havyard will design vessels for the service and maintenance of offshore wind turbines. The basis for this design, however, is taken from technology that Havyard has developed and delivered to the offshore oil industry for a long time.

"We are very pleased about agreeing on this contract with ESVAGT for delivery of their new wind turbine service vessels. We have worked with ESVAGT and these projects over a long period of time and it has been a demanding process. ESVAGT is a very competent and professional customer and is a market leader within its field of expertise. This is both challenging and rewarding.

"Havyard 832 SOV has been designed based on specifications from ESVAGT, and together with our solid competence in the shipbuilding and design of advanced offshore vessels, we have together made a product that the market demands."

Gisle Vinjevoll Thrane, Sales Manager,
Havyard Design and Solutions

Other ship designers like Ulstein and Rolls Royce are already in the offshore wind market with their specialised vessels and we will probably see rapid development in this segment in the years to come.

ÅKP will contribute by assuring close cooperation among the business, research and regional authority members of NCE Maritime.

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